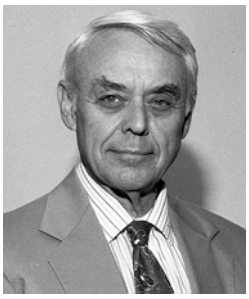
Nuclear Weapons and Effects



Charles J. Bridgman
PhD, North Carolina State University, 1963

Professor Emeritus of Nuclear Engineering,
Dept of Engineering Physics,
(937) 255-3636 x4679
Charles.Bridgman@afit.edu

Dr. Bridgman's interests center around nuclear weapon effects, military nuclear power applications, and nuclear weapon fallout modeling. He is the author of numerous technical articles in a wide variety of journals. In his 38 years on the AFIT faculty, he has chaired over 120 MS theses and PhD dissertations.

Vincent J. Jodoin, Maj, USAF
Ph.D., Air Force Institute of Technology, 1994

Assistant Professor of Nuclear Engineering,
Department of Engineering Physics
(937) 255-3636 x4506
Vincent.Jodoin@afit.edu

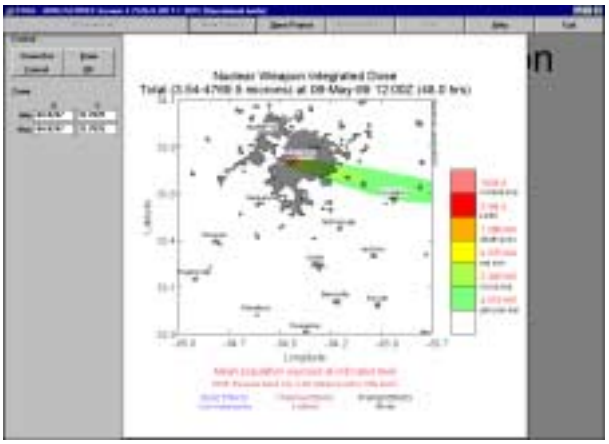
Major Jodoin's research interests center around nuclear weapon effects and countering nuclear weapon proliferation. He has served on the Engineering Physics faculty since 1999 and is currently the chair of the Nuclear Engineering Curriculum Committee. Major Jodoin has been associated with nuclear weapon issues since 1985 and previously taught at the U.S. Air Force Academy.

Research Areas

- Neutral particle transport methods
- Non-ideal blast modeling
- Radioactive source term from weapons
- Fallout transport and dose estimates
- Radiation Effects in Electronics
- Radiation Hardening

Recent and Ongoing Research

A variety of research efforts are currently underway and include the development of new, nonlinear radiation transport algorithms and their incorporation into computer code to provide robust performance on computationally challenging problems. Investigations have been also conducted into the predictive capabilities of the Defense Threat Reduction Agency's Hazard Prediction and Assessment Capability code (HPAC). The radioactive source terms and ultimate dose to individuals as predicted by HPAC have been compared to theoretical predictions and to historical results. Additional research has been conducted into the rise and growth of nuclear clouds.



Defense Threat Reduction Agency's Hazard Prediction and Assessment Capability Code.

The prompt and residual effects of nuclear weapons on materials is also being investigated and includes non-ideal blast effects, thermal effects on layered structures, radiation effects in electronics, and determination of radiation hardness.

Vortex flow of rising nuclear fireball.

Experimental and Modeling Facilities

Experimental facilities are available for radiation detection, characterization of material changes, simulation of radiation environments, and analysis of the effects of the nuclear weapons environment. High-end personal computers are used extensively to take high-speed measurements as well as to model the environments of interest and changes to material characteristics in the weapons environment. For large computational requirements, the world class Aeronautical Systems Center's Major Shared Resource Center provides access to high-speed parallel processing systems and visualization tools.

Kirk A. Mathews
Ph.D., Air Force Institute of Technology, 1983

Professor of Nuclear Engineering,
Department of Engineering Physics
(937) 255-3636 x4508
Kirk.Mathews@afit.edu

Dr. Mathews has operational experience in nuclear power, nuclear weapons, and aboveground and underground nuclear weapons effects testing. Since joining the AFIT faculty in 1987, he has advised over two dozen theses and dissertations in a wide variety of military nuclear areas and has published over a dozen journal articles.

James C. Petrosky, LTC USA
Ph.D., Rensselaer Polytechnic Institute, 1995

Assistant Professor of Nuclear Engineering,
Dept. of Engineering Physics
(937) 255-3636 x4600
James.Petrosky@afit.edu

LTC Petrosky has experience in the interaction and characterization of radiation effects on semiconductor devices. His current research interests are in ionizing radiation effects in semiconductors, radiation hardening of devices, and use of modeling codes for physics and engineering instruction. LTC Petrosky previously taught nuclear engineering at the United States Military Academy, and is currently assigned to AFIT from the Defense Threat Reduction Agency.